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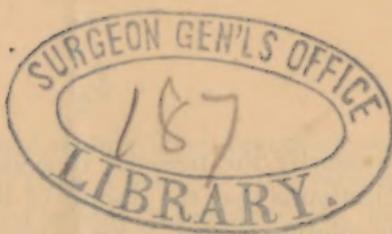
Cupric test pellets

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# CUPRIC TEST PELLETS.\*

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At a meeting of the Clinical Society of London, held January 23d, 1880, Dr. Pavay introduced to the notice of the profession a new qualitative test for sugar; strictly speaking, a new form of an old test, for it was nothing more than Fehling's solution transferred into a solid form; but the method of obtaining this form, was not explained.

As is well known, of all the tests for sugar in the urine the copper tests are the best, at least when delicacy and precision are aimed at. The best of these are Fehling's or Pavay's solutions, which contain cupric sulphate in combination with an alkaline tartrate, and in such a condition that when brought in contact with grape sugar, at a temperature of 100° Cent. (212° Fahr.), the cupric salt is reduced to its lower oxide, (cuprous oxide).

These solutions, although of well attested value, have one great objection, viz., the change which takes place when kept for any length of time, or when light and air have access to the fluid. This change allows the cupric sulphate in solution to become deoxydized when the fluid is boiled, without

\*Exhibit to the Philadelphia Pathological Society, March 25, 1880.

necessarily the presence of sugar. Another slight objection is that the stopple of the bottle in which the solution is kept, is apt to become fixed unless in constant use.

These points were given by Dr. Pavy, as his reasons for undertaking the incorporation of the ingredients of the ordinary test solution into a solid and permanent form; and at last, after many fruitless attempts, his efforts have been crowned with success, as shown by the presentation of his "cupric test pellets" to the Society, as above stated.

The great practical use of these pellets at once suggested itself to me, and I endeavored to have some made in this country, that their use might be made practicable without the great expense of importation.

In the report of Dr. Pavy's remarks,\* no mention is made of any formulæ, so it is fair to suppose that the doctor himself was ignorant of the processes by which he arrived at the result, stating that "his chemist surmounted all obstacles," etc. Therefore it is impossible for me to say whether the pellets to which I now call attention, are made in the same manner as the English. I suggested the idea to Mr. McKelway, chemist, having first called his attention to the matter, and desired him to make the necessary experiments, in which he has been so successful, and it is, therefore, through his aid I can now present to the profession the "cupric test pellets," being not only a convenient and practical means for detecting the presence of sugar in the urine, but also one for obtaining the exact amount; a quantitative, therefore, as well as a qualitative test.

\* *British Medical Journal*, February 7th, 1880.

*Qualitative.*—For detecting the presence of sugar proceed as follows: Place a pellet in a test tube, add a small quantity of water, (better distilled), heat, until perfect solution is obtained, when a clear, deep blue fluid will be the result. Then proceed in the same manner as when using Fehling's solution—for, in fact, it is now almost identical with it—add a few drops of the suspected urine, and if glucose be present, upon boiling, the cupric sulphate which is held in solution becomes deoxydized by the sugar present, and we have the cuprous or sub-oxide, which shows itself by the change in color, first as a yellowish precipitate, due to the hydrated sub-oxide, which subsequently loses its water and becomes the red sub-oxide.

*Precautions.*—The same precautions are, of course necessary here, as when using any of the copper tests.

The English pellets, up to this time, have been prepared only for qualitative analysis; we have, therefore, advanced a step in being able to determine the amount as well, as each pellet represents accurately five milligrams of grape sugar.

*Quantitative.*—The quantitative analysis is performed by the volumetric process in the same manner as with the ordinary copper test solutions.

The only simplification by using the pellet in this form of analysis is that it does away with the necessity of measuring or weighing, which is necessary when either Pavý's or Fehling's solution are employed.

*Approximate.*—With this new form of test a very accurate approximate result can be arrived at, which is practicable, simple, and requiring but a few mo-

ments for its accomplishment, and will, therefore, doubtless, meet a long-felt want to the busy practitioner, who may not have a laboratory at his disposal, or the time required for quantitative analysis by the ordinary methods.

Allow the urine to be tested to drop slowly into a large test tube, containing one cupric pellet in solution, at a boiling temperature, until the cupric sulphate is entirely deoxydized, which will be known by the disappearance of the blue color. Now, as the amount of sugar required to accomplish this result is known, the only thing that remains is to have some means of determining the quantity of urine used. This can be done by using a graduated pipette or *minim glass*.

It may be mentioned here, that it is better to dilute the urine, as then the test becomes more accurate, and the precise moment when the blue tint leaves can be readily determined.

*Example*—For example, fill a pipette graduated in cubic centimeters with a solution of one part urine to nine parts distilled water. Then keeping the test solution (one pellet having been dissolved) at a boiling point, over a spirit lamp, allow the diluted urine to flow slowly into the test tube until all blue disappears, when a glance at the pipette will indicate that it has taken, for example, 10 c.c. to accomplish this, therefore 10 c.c. of diluted urine represents 5 milligrams of diabetic or grape sugar: but as only 1-10 or 1 c.c. of this solution was urine, then in 1. c.c of urine examined there is .005 gram of sugar. If in 1 c.c. of urine there is .005 gram of sugar, in 1000 c.c. of urine there must be  $1000 \times .005$  gram or 5

grams. In this way, with a little calculation, the amount of sugar in any given quantity of urine can easily be determined. If a minim glass is used it is only necessary to substitute the word minim for cubic centimetre.

By using a little precaution, keeping the pellets in a well stoppered bottle, free from moisture, they may be kept for an indefinite time. It is better to avoid shaking them too much, as the edges may become broken and interfere with the accuracy required for quantitative analysis.

Before closing I must mention that Dr. H. G. Piffard\* has suggested, under the title of "A New Glycosuric Reagent," a pasty mass containing cupric sulphate, crystallized tartrate of sodium and potassium and sodic hydrate, which is said to remain permanent. But here again we have a qualitative test only.—*From the Medical and Surgical Reporter, April 10th, 1880.*

\**New York Medical Record*, March 23d, 1880.

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